

Why do girls' and boys' gender-(a)typical occupational aspirations differ across countries? How cultural norms and institutional constraints shape young adolescents' occupational preferences

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Abstract

Why do girls' and boys' gender-(a)typical occupational aspirations differ across countries? How cultural norms and institutional constraints shape young adolescents' occupational preferences

von Kathrin Leuze und Marcel Helbig*

Occupational sex segregation persists in all European and OECD countries; yet in some countries, it is more pronounced than in others. In this paper we seek to explain these cross-national variations by analyzing the realistic occupational aspirations of 15-year-old pupils in 29 EU and OECD countries. Based on socialization and rational choice approaches we develop hypotheses for how cultural norms and national institutions might influence the gender-typing of occupations. These are tested by applying 2-step multi-level models to the OECD's 2006 PISA study merged with country-level data from various sources. Results indicate that girls develop gender-(a)typical occupational aspirations in response to structural education and labor market differences across countries, while boys' gender-(a)typical aspirations are mainly influenced by country variations in normative prescriptions of gender-essentialist cultures and self-expressive value systems. The findings point at the necessity for differentiating both between micro- and macro-level explanations and between explanations for women and men.

Keywords: occupational aspirations, socialization, rational choice, cross-national comparison, EU, OECD

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Introduction

Gender inequalities in education have changed considerably in recent decades. Until the mid-1990s, the main focus was still on girls' and young women's disadvantages (Jacobs 1996), but this is not the case anymore. In almost all European and OECD countries, more women than men obtain tertiary qualifications (Buchmann and DiPrete 2006; OECD 2013); girls generally receive better grades in school and clearly outperform boys in reading literacy (OECD 2012). Boys, in contrast, have higher grade repetition rates and drop out more often from secondary schooling (Helbig 2012; Willingham and Cole 1997). They still score higher in math literacy than girls, but this gender gap is much smaller than the one in reading literacy (Else-Quest, Hyde, and Linn 2010; OECD 2012). Therefore, much research now addresses the "underachievement of boys" and looks for explanations why girls have outpaced boys in education (DiPrete and Buchmann 2013; Helbig 2012).

However, despite women's success in the education system, they continue to prefer and choose different occupations than their male counterparts. Across Europe and the OECD, women are overrepresented in health, clerical, and sales occupations and underrepresented in managerial and technical occupations (Charles 1992:490; Charles and Grusky 2004:61ff.). These gender-typical occupational choices would not be problematic if they did not come along with gender inequalities in the labor market, since women-dominated occupations pay lower wages and offer worse career prospects (Bygren 2004; Bygren and Kumlin 2005; Chan 1999; Cohen and Huffman 2003). Interestingly, despite these cross-national commonalities in occupational sex segregation, comparative studies also show considerable variation between different countries (e.g. Anker 1998; Charles 1992; Charles 2005; Charles and Grusky 2004). For example, the extent of occupational sex segregation is much higher in countries like the Netherlands, Finland, or Sweden, while it is lower in Germany, Japan, or Italy (Charles 1992; Charles and Grusky 2004). Most remarkable is the fact that occupational sex segregation is often most pronounced in countries that are viewed as most culturally progressive and most economically advanced (Blackburn, Browne, Brooks et al. 2002; Charles 2005; Estevez-Abe 2005).

But why are occupational preferences more gender-typical in some countries than in others? In this paper, we will seek to answer this question by analyzing macro-level determinants of realistic occupational aspirations of 15-year-old pupils in 29 EU and OECD countries. Realistic occupational aspirations (also often called occupational expectations) are considered as pupils' stable prefigurative orientations composed of their specific beliefs about their future trajectory through the educational system and their ultimate occupational position (Gottfredson and Lapan 1996:430; Morgan 2006:1528). In contrast to idealistic occupational aspirations, which refer to idealistic goals, realistic occupational aspirations refer to expected occupational outcomes, which

are formed by the individual with a consideration of the available resources and opportunities within given circumstances (Morgan 2006:1529). According to Gottfredson (1981; see also Gottfredson and Lapan 1996), the occupational aspirations of young adolescents at age 15 are already quite realistic, since through the process of gradual elimination of desirable, but “unrealistic” occupational preferences, young people create a set of occupational alternatives that are congruent with their sex, their socioeconomic status and their individual abilities and interests (Gottfredson 1996; Hannah and Kahn 1989; Blanchard and Lichtenberg 2001). We will therefore argue in the following that country differences in cultural prescriptions and structural constraints (and the perceptions of them) could play an important role in our understanding of cross-national variations of gender-(a)typical occupations aspirations.

In contrast to previous studies, which predominantly used some kind of aggregate index of occupational placement, such as the Index of Dissimilarity (Duncan and Duncan 1955), the size-standardized Index of Dissimilarity (Gibbs 1965), the Marginal Matching Coefficient (Blackburn, Jarman, and Siltanen 1993) or the Index of Association (Charles and Grusky 1995)¹, we will thus focus on individual occupational aspirations and how they are shaped by a country’s environment. This allows us to systematically disentangling individual-level and national-level explanations for the sex-typing of occupational preferences. In addition, we are able to analyze country-level explanations for gender-(a)typical occupational preferences separately for girls and boys in order to examine whether they are the same for both sexes, which is not possible if some aggregate measure of segregation is used.

Moreover, by examining occupational preferences rather than occupational placement, we are able to investigate the supply-side explanations of gender-(a)typical occupational aspirations (Okamoto and England 1999) and to leave aside demand-side processes (for a similar argument, see Xie and Shauman 1997). Even though employers are important for understanding actual occupational placement, the focus on supply-side mechanisms is more in line with central theoretical arguments advanced in the cross-national analysis of occupational sex segregation and therefore a better test of these theoretical propositions. In addition, gender-(a)typical aspirations have been shown to clearly predict working in gender-(a)typical occupations thereafter (e.g. Buchmann and Kriesi 2012; Morgan, Gelbgiser, and Weeden 2013; Okamoto and England 1999; Polavieja and Platt 2014), which also underlines the relevance of supply-side processes.

A final advantage is a better temporal fit between independent and dependent variables. Many studies on cross-national variations of occupational sex-segregation use independent country

¹ The merits and problems of many of these indices have been discussed widely (e.g. Blackburn et al. 1993; Bridges 2003; Charles and Grusky 1995) and are not in the focus of this paper.

variables of years close to when the composite indices were measured as dependent variables. However, since these composite measures typically reflect the occupations held by the labor force as a whole—that is, by men and women aged 15 to 64—the independent country variables are most likely to be measured quite some time after people in the workforce have started working in their current occupation, especially if they are older.² By focusing on the occupational preferences of 15-year-old boys and girls at a particular point in time, we are able to measure independent country-level predictors in closer proximity to our dependent variable and thus achieve a better temporal fit.

In the next section, we present the state of research and theoretical considerations about how occupational preferences are developed and shaped during childhood and early adulthood against the background of varying cultural and institutional environments. These hypotheses are tested in the following by means of multi-level random intercept models based on the 2006 Program for International Student Assessment (PISA). After describing this dataset and the operationalization of variables, we present our descriptive and multivariate results. The paper concludes with a short summary of our main findings, discusses its practical relevance as well as its implications for further research.

State of research and theoretical considerations

Occupational sex segregation refers to the fact that women and men work in different occupations. However, this form of horizontal unevenness would not be problematic if it did not come along with vertical inequalities in the labor market between the sexes (Baunach 2002; Blackburn, Brooks, and Jarman 2001; Bridges 2003). Most importantly, occupational sex segregation has significant implications for gendered career outcomes, since a higher share of women in a given occupation has a negative effect on individual wages in that occupation, which contributes to the gender wage gap (e.g. Aisenbrey and Brückner 2008; Cohen and Huffman 2003; Karlin, England, and Richardson 2002; Perales 2013). In addition, women-dominated occupations reproduce sex-segregated recruitment at the organizational level (Bygren and Kumlin 2005), generate “revolving doors” in the further course of the career (Jacobs 1989b), and come along with cumulative disadvantages over the life course (Bygren 2004; Chan 1999). Therefore, occupational sex segregation is often used as one explanation for why women are still not able

² Such time differences between the dependent and independent variables would not be problematic if there were reasons to assume that the size of the independent variables did not change over time. Yet such an assumption is not reasonable since most theoretical arguments in the current literature on this topic are based on historical changes brought about by modernization. Studies analyzing sex segregation by fields of study instead of occupations (e.g. Barone 2011; Bradley 2000; Charles and Bradley 2002; Charles and Bradley 2009) are less confronted with this problem.

to translate their improved success in the education system into successful careers in the labor market.

Since it is widely acknowledged that typical “male” and “female” occupations come along with different career prospects, we need to understand not only why women continue to prefer different occupations than men, but also why these preferences differ across countries. In the following, we therefore refer to socialization and rational choice approaches, which explain the development of gender-(a)typical occupational aspirations on the individual level. Subsequently, we discuss each of the theoretical mechanisms against varying institutional backgrounds in order to develop hypotheses for cross-national variations of the sex-typing of occupations. To do so, we differentiate, on the one hand, between the development of gender-typical versus gender-atypical occupational preferences, and, on the other hand, between explanations affecting girls and boys in a similar versus in a different manner.

Individual-level explanations for gender-(a)typical occupational aspirations

Gender-(a)typical socialization processes can take place through two distinct processes supporting the development of gender-(a)typical occupational aspirations: the internalization of cultural norms and the imitation of same-sex role models. The former process starts right after birth and before children are capable of attributing themselves to a particular sex category, when they are confronted with gender-typical expectations of their social environment. During socialization in childhood and early adulthood, boys and girls develop values, skills, and self-concepts in accordance with these gendered expectations (Ruble, Martin, and Berenbaum 2006), also as regards the gender-typing of occupations (Eccles 1987). As early as the age of six, girls and boys are able to identify the occupations that are typical and appropriate for their respective sex (Etaugh and Liss 1992; Lipka and Connely 1990). These stereotypical occupational preferences are accepted and internalized during childhood (Marini and Brinton 1984; Okamoto and England 1999) and stabilize until around the age of 14 for boys and only a little later for girls (Gottfredson 1981; Schoon 2001). Thus, gender-typical expectations steer girls towards female-typical and boys towards male-typical occupations (Eccles 1987).

The degree to which significant others, first and foremost parents, develop gender-typical expectations strongly depends on their gender role attitudes, for example regarding the role of women in society, women’s and mothers’ involvement in the labor market and the gendered division of household labor (Busch-Heizmann 2015; Davis and Greenstein 2009; Eccles 1987). Parents with more traditional gender role attitudes are more likely to prefer more gender-typical occupational choices of their offspring and will also transfer these preferences to their sons and daughters (Burlew 1982). As a consequence, girls and young women with traditional

gender role attitudes also have strong preferences for female-typical occupations (Strange and Rea 1983; Tittle 1981). In contrast, parents with higher socioeconomic backgrounds and higher educational credentials have more progressive gender role attitudes, which they also confer upon their children (Alwin, Braun, and Scott 1992; Davis and Greenstein 2009). Thus, in families with higher education and socioeconomic status and less traditional gender role attitudes, children (and girls in particular) develop less stereotypical occupational aspirations (Dryler 1998; Helbig and Leuze 2012; Polavieja and Platt 2014).

Yet the claim that parents could raise their children's educational and occupational attainments by simply imposing higher expectations is disputed in the literature (Morgan 2006:1530). Rather than the internalization of normative expectations, the imitation of same-sex role models has been argued to matter in the process of developing gender-(a)typical occupational aspirations. While the process of norm internalization does not differentiate between the sex of the respective socialization agent, the same-sex hypothesis assumes that children and teenagers tend to identify with the parent of the same sex (Eccles and Hoffman 1984; Ruble et al. 2006). Daughters imitate the values, behaviors, and self-concepts of their mothers in order to learn how to develop into a competent female adult, while sons identify with their fathers (Bussey and Bandura 1999). When developing occupational preferences, girls thus tend to orientate themselves towards the occupation of their mothers, while the occupation of fathers is more important for boys (Almquist and Angrist 1971; Dryler 1998; Rosen and Aneshensel 1978; Shu and Marini 1998). Therefore, the relevance of same-sex role models is also likely to cause deviations from traditional choices. Occupational aspirations of children are less stereotypical if their same-sex parent works in a non-traditional occupation (Buchmann and Kriesi 2012; Helbig and Leuze 2012; Polavieja and Platt 2014; Shu and Marini 1998). As a consequence, both normative gender role expectations and the imitation of same-sex role models can explain why girls and boys develop more or less gender-typical occupational aspirations.

However, socialization theories have been criticized in two ways, namely that they overemphasize the importance of early childhood experiences as primary sources of socialization and that they leave very little room for individual agency (Elder 1994; Polavieja and Platt 2014:32f.). Building on the second criticism, rational choice approaches argue that boys and girls rationally consider the pros and cons of particular occupational alternatives (Morgan 2006). Even though socialization and rational choice processes are often deemed incompatible, they rather seem to complement each other in the processes of occupational preference development (Eccles 1987; Eccles 1994; Gottfredson and Lapan 1996). Depending on the values, skills and self-concepts girls and boys develop in response to gender-role socialization processes, they prefer occupations offering the subjectively highest level of utility to them, which is based on the

expected benefits of, the subjective probability of successfully gaining access to, and the costs of working in particular occupations (Eccles 1987; Jonsson 1999).

The expected benefits of an occupation are strongly associated with monetary and non-monetary rewards. From the perspective of neo-classical economic theory, rational women prefer working in female-typical occupations because these are better suited for combining wage work and family work (Becker 1985; Polachek 1981).³ But benefits might also differ because boys and girls value different characteristics of particular occupations. Boys, for instance, appreciate having a career and earning a high income as well as working with “things”, whereas girls appreciate helping others, working together with people, and combining wage work and care work (Busch-Heizmann 2015; Eccles, Barber, and Jozefowicz 1999; Jonsson 1999; Shu and Marini 1998). Both benefit considerations make gender-typical occupational aspirations for both sexes more likely. When assessing the probability of success, boys and girls evaluate whether their abilities are adequate for entering a particular occupation. Girls generally assume that their probability of success is lower in male-typical subjects at school, such as mathematics or natural science, and as a consequence also in male-typical occupations. In contrast, boys anticipate a lower probability of success in female-connoted subjects, such as reading or languages, and occupations, for example in service and health care (Eccles 1994; Eccles et al. 1999). As a consequence of these evaluation processes, girls and boys generally make more gender-typical occupational choices, irrespective of their actual competence performance (Jozefowicz, Barber, and Eccles 1993). Yet it has also been shown that girls with better grades in mathematics and boys with better grades in reading develop more gender-atypical occupational preferences (Helbig and Leuze 2012; Wang and Degol 2013).

Regarding the costs associated with preferences for particular occupations, it is difficult to evaluate whether these differ between the sexes. On the one hand, the direct and indirect costs related to particular types of occupational training should be similar for men and women (Jonsson 1999). On the other hand, the anticipated consequences of having minority status in a gender-atypical occupation might cause discomfort and therefore generate costs when developing gender-atypical occupational aspirations (Eccles 1994; Jonsson 1999), which makes gender-typical choices for both sexes more likely.

In sum, both socialization and rational choice theories are well suited to understand the development of gender-typical and gender-atypical occupational aspirations among young people. However, they cannot explain why, on the national level, the sex-typing of occupations is more pronounced in some countries than in others. In the following, we therefore develop both

³ Yet many of these neoclassical assumptions were empirically disproved (e.g. Busch-Heizmann 2015; Cech, Rubineau, Silbey et al. 2011; Morgan et al. 2013; Okamoto and England 1999).

frameworks further by systematically integrating cross-national variations in the institutional and cultural environment.

Country-level explanations for gender-(a)typical occupational aspirations

According to socialization theory, gender-(a)typical parental expectations and role models will influence daughters and sons to develop gender-(a)typical occupational preferences. However, Xie and Shauman (1997) argue that occupational socialization not only depends on parents, but is also conveyed to children through multiple sources in their social environment, including older siblings, teachers, peers, but also the media. It is experiences with adult workers in general and not just the parents that influence occupational choices. Therefore, the whole social environment at the societal level can be seen as a source of the sex-typing of occupations for girls and boys.

The degree to which these socializing agents of the larger environment have stereotypical expectations as regards the sex-typing of occupations should be influenced by a country's prevailing gender ideology, which represents the level of support for the division of wage work and caregiving work between men and women based on the notion of separate spheres (Davis and Greenstein 2009). In more modern countries, stereotypical gendered expectations of the social environment should be less legitimate, since the prevailing gender ideology is generally more egalitarian (Inglehart 2008; Ramirez and Wotipka 2001). "By these accounts, sex segregation is a traditional relict that will decline [...] as egalitarian values become manifest in attitudes and career aspirations." (Charles and Bradley 2009: 925) Thus, in more egalitarian societies, relevant socialization agents should exhibit less traditional expectations towards girls' and boys' gender-typing of occupations. **(H1) In countries with a more progressive gender ideology, girls and boys should develop more gender-atypical occupational aspirations.**

Likewise, same-sex role models are not restricted to mothers and fathers but also include further relevant others, such as peers, teachers, or women and men in the media, meaning that girls and boys are able to abstract sex-appropriate behavior from their concrete observations of relevant others.⁴ Similar to what Xie and Shauman (1997:239f.) propose in their reflection model, we therefore assume that occupational choices should not only reflect parental role models but also the actual occupational distribution of men and women in the adult labor force. The more an occupation is dominated by women, the more it becomes socially identified as a "female" occupation in all forms of media, and the more likely it will be perceived as female-appropriate by young people (Xie and Shauman 1997). In contrast, if boys and girls observe a

⁴ See Legewie and DiPrete (2014) for a similar argument on how the sex segregation of extracurricular activities in high schools might affect the development of STEM aspirations.

larger share of men and women working in non-traditional occupations in their social environment, these men and women could also serve as same-sex role models who influence pupils' occupational aspirations. **(H2) In countries with a lower degree of occupational sex segregation, girls and boys should develop more gender-atypical occupational aspirations.**

Today, much evidence can be found to support these modernization arguments in respect of mathematical competencies and educational aspirations, since girls benefit more strongly in countries where women have gained more formal legal and political rights (Riegle-Crumb 2005), participate more strongly in the labor market (Marks 2008), and where gender ideologies are more egalitarian (McDaniel 2010). However, with respect to the horizontal segregation of occupations, relatively few changes have occurred (Charles and Grusky 2004). Therefore, Charles and Bradley (2009) argue that modernization approaches cannot account satisfactorily for cross-national variations in occupational sex segregation since they underestimate the enduring cultural force of gender-essentialist ideologies, i.e. widely shared beliefs that women and men are naturally and fundamentally different. These ideologies continue to shape the life experiences, expectations, and behaviors of men and women, even in the most egalitarian countries, and thus contribute to the persistence of occupational sex segregation (Charles 2011; Charles and Grusky 2004).

Moreover, the effect of gender-essentialist beliefs is argued to be intensified by a strong Western cultural emphasis on values of individual self-expression and self-realization, brought about by the transition from industrial to post-industrial society (Charles and Bradley 2009; Charles, Harr, Cech et al. 2014). In the course of modernization, value priorities have shifted from an emphasis on economic and physical security toward increasing emphasis on subjective well-being, self-expression, and quality of life (Inglehart and Welzel 2005). Even though the shift from survival to self-expressive values is accompanied by rising public support of gender equality (Inglehart 2008), gender-essentialist beliefs nonetheless remain important for the development of human identity. Therefore, Charles and Bradley (2009) argue that self-expressive value systems tend to encourage the development and enactment of culturally masculine or feminine traits, including occupational aspirations. **(H3) In countries with stronger self-expressive value systems, boys and girls should develop more gender-typical occupational aspirations.**

Besides changes in norms and values as a consequence of modernization processes, labor market changes have also been argued to promote gender-differentiated occupational aspirations. The postindustrial restructuring of labor markets in particular led to an increasing demand for "female-typed" non-manual work, especially in the service sector (Charles 2005; Charles and Grusky 2004). Market-based service activities often involve tasks that are functionally and symbolically similar to women's traditional domestic activities (such as personal service

industries), and they often demand emotional labor or interpersonal skills that are female-labeled (such as in retail sales, banking, communication industries) (Charles 2005). Rational young women will know about their growing employment opportunities in the non-manual sector. This should also increase their benefits of working in these occupations since they correspond with female-typical work values. In particular, large-scale participation of women in high-status professional and managerial occupations will increase girls' professional role confidence (Cech et al. 2011) as well as the monetary and status returns when aspiring to work in these formerly male-dominated occupations. Thus, it becomes more rational for girls and women to aspire to careers in these sectors of the economy, because they perceive more employment opportunities for women in high-status occupations (Estevez-Abe 2005). **(H4) In countries with large-scale participation of women in professional and managerial occupations, girls will develop more female-typical occupational aspirations.** However, it is not possible to derive such a clear assumption for boys, since they might either refrain from entering a female-labelled sphere of the labor market or continue to prefer professional and managerial occupations due to their high labor market rewards.

But cross-country variation might occur not only regarding the benefits of particular occupations but also regarding the probability of success for entering typical "male" and "female" occupations (Jonsson 1999). As has been argued on the individual level, boys prefer male-typical occupations due to their higher competencies in mathematics and sciences. Yet recent research on gender differences in math ability shows that the gap in math performance has largely closed in some countries, while it persists in others (Else-Quest et al. 2010). In contrast, the gap in verbal test scores continues to favor girls and has not changed over time, but also differs across countries (OECD 2012). Taken together, in some countries girls are on average more likely to outperform boys in all competence domains than in others, thus have a higher overall competence advantage. This might increase girls' confidence in these countries to successfully enter male-typical occupations, irrespective of their individual competences, since girls with high levels of self-esteem are expected to aim "higher" in the occupational structure and thus to have less traditional occupational aspirations (Polavieja and Platt 2014). Given that male-typical occupations are generally regarded as requiring higher skill levels and competencies, girls will prefer more male-dominated occupations in those countries where they generally perform better in the schooling system. **(H5) In countries with a higher overall competence advantage for girls, girls will develop more gender-atypical occupational aspirations.** Again, it is difficult to predict whether this assumption should also hold for boys, since for them it is generally rational to prefer male-typical occupations due to their higher returns.

Data, operationalizations, and methods

In order to test our hypotheses empirically, we combine individual-level data from the 2006 Programme for International Student Assessment (PISA) with country-level information from various sources, such as the Organization for Economic Cooperation and Development (OECD), International Labor Organization (ILO), Eurostat, the World Value Survey and the International Social Survey Program. The 2006 PISA survey focused on scientific literacy and sampled a total of more than 400,000 15-year-old pupils from 57 countries (OECD 2007). Yet since the level and development of sex segregation varies between developed and developing countries (Chang 2004; Charles and Bradley 2009), we analyze a total of 29 EU and OECD countries (see Table 1). Due to data limitations regarding the sex composition of occupations, we had to exclude the OECD countries Australia, Japan, Mexico, New Zealand, and South Korea, as well as the EU countries Cyprus, Malta and Romania from our analysis.

To operationalize the occupational aspirations of the 15-year-old PISA participants, they were asked “What kind of job do you expect to have when you are about 30 years old?”.⁵ Such a measure is well suited to capture realistic aspirations, since it refers to occupational preferences that young adolescents consider realistic in terms of suitability and accessibility in adult life. In order to assess whether occupational aspirations are more or less gender-typical, we calculated the share of women in each occupational category based on nationally representative labor force statistics mainly from the ILO Segregate Database for the years 2000 and 2001.⁶ Since occupations in this database are coded according to the 3-digit version of the Standard Classification of Occupations 1988 (ISCO88), they were merged on this basis to the PISA micro-level data. The larger the share of women in each occupational category, the more female-typical is the occupational aspiration of the respondent. In addition, we also generated a categorical variable, which differentiates between female-dominated occupations ($\geq 70\%$ women),

⁵ A substantial share of girls and boys had missing values in this item, including answers like housewife, student, or welfare recipient. In the full sample of our 29 countries, 22.8 percent of the answers were missing: 20.6 percent for girls and 25 percent for boys, being lowest in the Netherlands (13.2%), United Kingdom (14.6%) and Italy (15.7%) and highest in Germany (33.8%), Austria (33.2%), and the Czech Republic (32.6%). One might argue that such a high number of missing values, especially on the dependent variable, is problematic for data analysis. Yet in this case it is also a reflection of social reality, since not all young adults at age 15 have already made up their minds about which occupations they would like to work in.

⁶ More up-to-date data on the share of women in each occupational category was not available for such a large sample of countries. However, since research on the development of occupational sex segregation indicates that since the 1980s and 1990s hardly any changes have been observable (Baunach 2002; England and Li 2006; Jacobs 1989a; Mann and DiPrete 2013), we consider the time lag of six years acceptable.

integrated ($> 30\%$ and $< 70\%$ women) and male-dominated occupations ($\leq 30\%$ women). This allows us investigating whether effects are observed for either female-typical (vs. integrated and male-typical) or male-typical (vs. integrated and female-typical) occupational aspirations only or both. A detailed description of all the variables, including their coding and respective sources, is provided in Appendix A.

Our main independent variables are all at the country level. An aggregate indicator of societal attitudes towards the division of household labor is used to assess the prevailing gender ideology in a country. This measure is based on the weighted country mean to the question “Both the husband and wife should contribute to household income” from the International Social Survey Program (ISSP) (2002) and the World Value Survey (WVS) (1999).⁷ The index is standardized to values from 0 to 100 with higher values indicating a more progressive gender ideology in a country.

To assess the degree to which girls and boys are surrounded by a large share of same-sex role models holding gender-typical occupations, we estimated the Index of Dissimilarity as a measure for sex segregation per country. The Index of Dissimilarity, based on the work of Duncan and Duncan (1955), gives the proportion of women (or men) who would need to change their occupation to achieve an occupational sex composition that equals the sex composition of the labor market.⁸

Self-expressive value systems are operationalized by using the Survival/Self-expression value scale as provided by Inglehart and Welzel (2005). According to them, self-expression values give high priority to environmental protection, tolerance of diversity, rising demands for participation in decision making in economic and political life, tolerance of outgroups (including foreigners, gays, and lesbians), gender equality, and a shift in child-rearing values (Inglehart and Welzel 2005).⁹

⁷ We alternatively used the aggregate responses to the statements ‘A working mother can establish just as warm and secure a relationship with her children as a mother who does not work’ and ‘Being a housewife is just as fulfilling as working for pay’, but both measures did not have an effect. The use of an index consisting of all three measures yields similar results as the one included, but was not chosen due to very low values of Cronbach’s alpha (< 0.3).

⁸ The Index of Dissimilarity has repeatedly been criticized for not being independent of the distribution of men and women in the labor force and therefore not being comparable across countries (Bridges 2003; Charles and Grusky 1995). However, since we also control for the female to male employment rate in our models, we think that using it for the purpose of this paper is acceptable.

⁹ Since this indicator is much in line with other indicators on modernization, such as GDP per capita or the share of people employed in the service sector, the correlation between these indicators is very high (0.7314, 0.7992, and 0.8236, respectively). Therefore, we did not include all three variables in the models, but focus on self-expression, which is more in line with our

To measure women's employment opportunities in high-status positions, we estimated the proportion of women employed in professional and managerial positions (ISCO88 major groups 1 and 2) of all women in employment based on ILO Labor Statistics Database.

Table 1: Overview of country variables

| Country | Girls' aspirations % women | Boys' aspirations % women | Gender ideology | Index of dissimilarity | Self-expression values | % women in high status occupations | Girls' competence advantage |
|----------------|---------------------------------------|--------------------------------------|------------------------|-------------------------------|-------------------------------|---|------------------------------------|
| AT | 57.14 | 24.71 | 41.58 | 1.43 | 55.31 | 14.15 | 22.00 |
| BE | 58.19 | 26.41 | 29.11 | 1.13 | 54.88 | 34.63 | 33.00 |
| BG | 59.89 | 57.98 | 27.59 | -1.01 | 55.11 | 21.88 | 61.00 |
| CA | 54.02 | 41.88 | 33.55 | 1.91 | 48.12 | 26.10 | 18.00 |
| CH | 53.87 | 23.04 | 29.26 | 1.90 | 55.21 | 17.82 | 18.00 |
| CZ | 58.45 | 24.83 | 35.20 | 0.38 | 68.74 | 16.80 | 36.00 |
| DE | 56.34 | 29.84 | 51.61 | 0.64 | 55.25 | 16.01 | 23.00 |
| DK | 55.14 | 26.74 | 42.08 | 1.87 | 56.19 | 18.38 | 19.00 |
| EE | 63.37 | 30.71 | 40.97 | -1.19 | 62.67 | 28.77 | 45.00 |
| ES | 49.05 | 24.11 | 46.41 | 0.54 | 52.40 | 21.30 | 28.00 |
| FI | 64.03 | 27.68 | 34.35 | 1.12 | 59.45 | 24.27 | 40.00 |
| FR | 52.60 | 27.22 | 38.67 | 1.13 | 54.64 | 19.38 | 28.00 |
| GR | 46.29 | 28.52 | 58.31 | 0.55 | 45.28 | 24.82 | 51.00 |
| HU | 54.30 | 30.49 | 20.03 | -1.22 | 56.68 | 22.60 | 30.00 |
| IE | 57.80 | 26.75 | 33.64 | 1.18 | 55.81 | 32.45 | 23.00 |
| IS | 52.49 | 30.06 | 35.50 | 1.63 | 57.56 | 25.29 | 54.00 |
| IT | 43.45 | 26.61 | 45.12 | 0.60 | 46.32 | 18.28 | 24.00 |
| LT | 63.87 | 37.28 | 21.42 | -1.00 | 56.49 | 30.02 | 49.00 |
| LU | 51.27 | 26.08 | 35.53 | 1.13 | 52.57 | 26.33 | 15.00 |
| LV | 58.40 | 31.66 | 38.82 | -1.27 | 57.52 | 25.34 | 45.00 |
| NL | 59.16 | 30.31 | 43.43 | 1.39 | 52.15 | 25.93 | 11.00 |
| NO | 48.08 | 21.76 | 50.04 | 2.17 | 57.44 | 15.37 | 40.00 |
| PL | 61.53 | 35.40 | 27.88 | -0.14 | 51.01 | 27.14 | 32.00 |
| PT | 54.24 | 30.60 | 37.86 | 0.49 | 53.41 | 16.32 | 18.00 |
| SE | 51.62 | 26.33 | 35.66 | 2.35 | 57.66 | 23.96 | 35.00 |
| SI | 61.23 | 31.47 | 35.98 | 0.36 | 53.75 | 23.99 | 49.00 |
| SK | 59.01 | 34.83 | 33.67 | -0.43 | 62.75 | 17.96 | 28.00 |
| UK | 56.86 | 27.44 | 33.84 | 1.68 | 53.93 | 24.79 | 13.00 |
| US | 52.15 | 35.47 | 16.31 | 1.76 | 41.46 | 38.09 | 26.00 |
| Total | 55.65 | 30.21 | 36.33 | 0.73 | 54.82 | 23.39 | 31.52 |

Data sources: see Appendix A

Young women's overall competence advantage in the educational system is measured by comparing country means of girls' scores in reading and mathematics with boys' based on the PISA 2006 data. More specifically, we subtracted boys mean competence scores from girls' mean

theoretical argument. As a robustness check, we also ran the full models with GDP per capita and the size of the service sector alternatively (see Appendix D).

competence scores, separately for reading and mathematics. The results were summated, being closer to zero if the stronger performance of girls' in reading is compensated by higher mathematical skills of boys, and being higher if girls' relative performance is better in both competence domains.

Finally, we use the female to male employment rate, since women's increasing participation in the labor market in postindustrial societies should lead to greater occupational integration (Charles 1992). Table 1 shows the cross-national variation of these macro-level variables among the countries in our study. In the multivariate models, all metric variables on the country level were centered on the sample mean and size standardized.

In addition, we include the following control variables on the individual and household level in our models: the Index of Economic, Social and Cultural Status (ESCS) of the respondent's parents as provided by PISA and the gender-typing of the occupation of the respondent's mother and father to control for individual-level socialization processes; math and science literacy, respondent's general value attributed to science, and respondent's future-oriented science motivation to control for individual-level rational choice processes; and age, school grade, and migration status as further controls. All metric and dummy variables on the individual level were centered on the country mean to facilitate the interpretation of the intercept in a two-step multilevel model.

After listwise deletion of persons with missing values on the individual-level variables, the final sample of our analyses contains 80,723 girls and 76,498 boys in 29 countries. Since due to the sampling procedure of PISA 2006, respondents are nested in schools and countries, the data can be represented as a hierarchical, three-level structure, where level-1 units are individuals nested within schools (level 2) and countries (level 3); yet, since our main explanatory variables are on the country level, we only included individual and country level predictors. The general three-level model can be written as follows:

$$y_{isc} = \alpha + \beta x_i + \beta x_c + e_{isc} + e_{sc} + e_c, \text{ where}$$

y_{isc} = percent women in occupation aspired to at age 15 of respondent i in school s and country c ,
 α = constant, β = coefficients, x_i = explaining variables on the individual level, x_c = explaining variables on the country level, e_{isc} = error term on the individual level, e_{sc} = error term on the school level, and e_c = error term on the country level.

Multilevel models can be estimated using two strategies, the relative advantages and practicality of which are dependent on the data structure (Franzese 2005). On the one hand, the effects of individual-level and country-level parameters can be estimated simultaneously. On the other hand, in a two-step approach, the individual-level parameters can be estimated in a first step within each country (level-1 regression). In a second step, the resulting intercepts (or

coefficients) can be used as dependent variables for the macro-level regression (level-2 regression). The two-step approach provides a very flexible specification because all individual-level effects are allowed to vary across countries without imposing any further distributional assumptions (see Gebel and Giesecke 2011 for a similar approach).

Using this two-step procedure, we estimate three level-1 models for girls and boys: 1) the share of women in the occupational aspiration by means of linear multilevel models, 2) having a female-typical occupational aspiration ($\geq 70\%$ women), and 3) having a male-typical occupational aspiration ($> 30\%$ women), both by means of linear probability multilevel models. Thus, all level-1 models take into account the nestedness of pupils within schools by estimating two-level hierarchical models. The theoretically relevant coefficients of these level-1 models for our first dependent variable, the share of women in an occupational aspiration, are found in the Appendix B. They support this type of modelling strategy since most predictors on the individual and household level differ both in size, significance and direction. The level-2 models use the intercepts of all level-1 models as dependent variables and estimate these by means of OLS regression for the 29 countries.

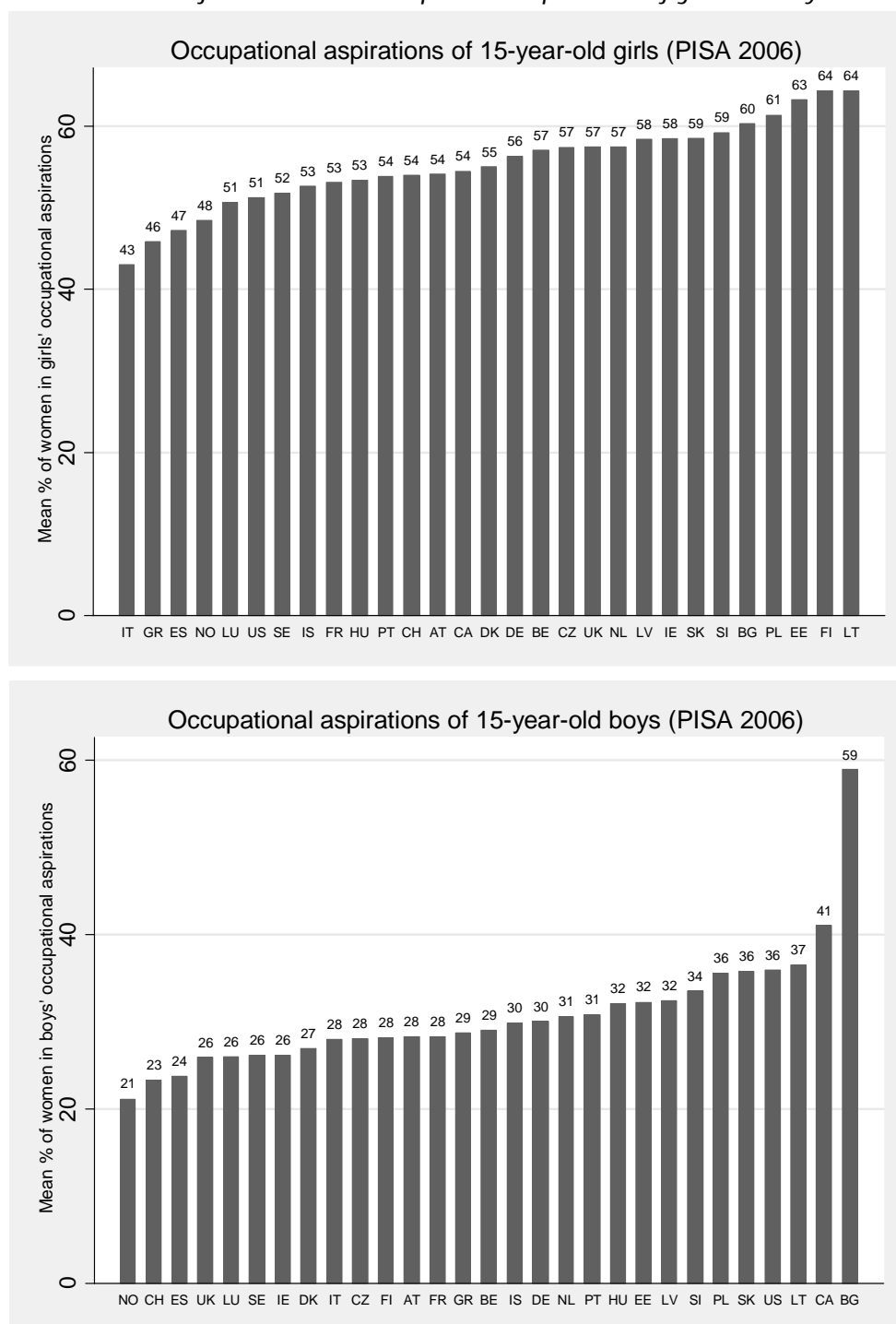
Multivariate results

Figure 1 shows the intercepts of the level-1 models for our first dependent variable, namely the mean share of women in the occupational aspirations of 15-year-old girls (first panel) and boys (second panel) per country. As can be seen from the figure, in almost all countries girls wish to work in occupations with a larger share of women than boys, indicating that both sexes have rather gender-typical occupational aspirations. The main exception to this pattern is Bulgaria, where the mean share of women in the aspired occupation is very similar for both sexes, which is driven by the nontraditional occupational aspirations of boys.¹⁰ But these graphs also demonstrate that in most countries the gender-typing of occupations is more pronounced for boys than for girls. Interestingly, the countries with the most gender-typical aspirations are not the same for both sexes. While girls' occupational aspirations tend to be most stereotypical in Finland, Lithuania, Estonia, Poland, and Slovenia, boys develop more traditional occupational aspirations in Norway, Switzerland, Spain, the Czech Republic, and Austria, which demonstrates

¹⁰ For that reason, we also estimated the multivariate models without Bulgaria as a robustness check, but results did not change.

that cross-national variations in the sex-typing of occupations differ between girls and boys, a fact that cannot be captured by means of aggregate measures of occupational sex segregation.

Figure 1: Mean share of women in the occupational aspirations of girls and boys (PISA 2006)



Intercepts of the level-1 models for the mean share of women in the aspired occupation after controlling for individual and household level characteristics

Data: PISA 2006 merged with data from the ILO Segregate Database

Table 2 displays the results of the level-2 regression models including all of our country-level predictors. The results of models including only one country-level predictor per model are found in Appendix C. To facilitate the comparison of effect sizes, parameter estimates are standardized (i.e., with variables measured in standard deviations from the pooled mean). The resulting coefficients give the change of the share of women in the desired occupation (models 1 and 4) or the change in the probability of aspiring a female- or male-typical occupation (models 2/3 and 5/6) that is associated with a one-standard-deviation increase in the respective covariate.

Table 2: Level-2 linear regression models for girls' and boys' occupational aspirations

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|----------------------------------|---------------------------------|---------------------------------|----------------------------------|---------------------------------|---------------------------------|
| | Girls, % women | Girls, fem. occupation | Girls, male occupation | Boys, % women | Boys, fem. occupation | Boys, male occupation |
| Progressive norms reg. division of wage work | -0.035 (0.806) | 0.019 (0.025) | -0.001 (0.008) | -2.274 ⁺ (1.292) | -0.001 (0.011) | 0.019 (0.024) |
| Index of dissimilarity | -2.862 ^{**} (0.832) | -0.031 (0.025) | 0.030 ^{**} (0.009) | -3.792 ^{**} (1.334) | -0.028 [*] (0.012) | 0.070 ^{**} (0.025) |
| Survival/self- expression values | 2.895 [*] (1.060) | 0.092 ^{**} (0.032) | -0.011 (0.011) | -4.696 [*] (1.700) | 0.002 (0.015) | 0.078 [*] (0.031) |
| Women in professions, management | 1.943 [*] (0.776) | 0.057 [*] (0.024) | -0.029 ^{**} (0.008) | -1.347 (1.244) | 0.007 (0.011) | -0.005 (0.023) |
| Girls' overall competence advantage | -1.450 ⁺ (0.791) | -0.033 (0.024) | 0.023 ^{**} (0.008) | 1.482 (1.269) | 0.002 (0.011) | -0.007 (0.023) |
| Female to male employment rate | 3.303 ^{**} (0.966) | 0.056 ⁺ (0.029) | -0.017 ⁺ (0.010) | 2.839 ⁺ (1.550) | 0.029 [*] (0.013) | -0.050 ⁺ (0.029) |
| Constant | 52.975 ^{***} (0.730) | 0.258 ^{***} (0.022) | 0.155 ^{***} (0.008) | 31.575 ^{***} (1.171) | 0.069 ^{***} (0.010) | 0.504 ^{***} (0.022) |
| Observations | 29 | 29 | 29 | 29 | 29 | 29 |
| R ² | 0.707 | 0.496 | 0.628 | 0.571 | 0.453 | 0.501 |

Data sources: PISA 2006 data merged with macro-level indicators from several sources, authors' estimations

Standard errors in parentheses, + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.00

Regarding our variables of interest, countries with a more progressive gender ideology regarding the division of wage work within households do not have a desegregating effect, neither for girls' nor for boys' occupational aspirations. Even though the coefficients for girls are in the right direction as long as no further variables are controlled for (see Models 1 and 2 in Appendix D), the effect for boys is in contrast to our theoretical assumptions. Boys tend to prefer occupations with a lower share of women in countries with a more progressive gender ideology (Model 4), yet not statistically significant (p<0.1). Thus, our Hypothesis 1, namely that girls and

boys living in countries with a more progressive gender ideology should develop more gender-atypical occupational aspirations, has to be rejected. Even though the prevailing gender ideology is generally more egalitarian in advanced industrial societies (Davis and Greenstein 2009; Inglehart and Welzel 2005), this does not seem to correspond to less stereotypical gendered expectations from the social environment as regards occupational aspirations. These results are in line with previous findings that modernization approaches “underestimate the enduring forces of gender-essentialist ideology [...], which has proven to be extremely influential in shaping life experiences, expectations, and aspirations, even in the most liberal egalitarian countries” (Charles and Bradley 2009: 925; see also Charles and Grusky 2004; Charles 2011).

Our second hypothesis assumed that a larger share of same-sex role models in the societal environment should lead to a stronger gender-typing of occupations. Coefficients on the effect of the Index of Dissimilarity confirm this hypothesis, since they indicate that in countries with higher levels of occupational sex segregation girls aspire occupations with a higher share of women and boys those with a lower share of women (Models 1 and 4). These effects are particularly pronounced as regards the development of gender-typical occupational aspirations, as indicated by Model 2 for girls and Model 6 for boys. These results imply that the amount of occupational sex segregation in the labor market is an important dimension for understanding the occupational preferences of young women and men, since it affects the degree to which they perceive same-sex role models in society working in traditional occupations. Our finding thus supports that of Xie and Shauman (1997) regarding the US labor market, according to which the influence of occupational sex segregation on the sex-typing of occupational preferences is robust even after controlling for other characteristics of the occupational structure. Girls and boys are socialized not only by their immediate social environment but also by the way in which the labor force as a whole is organized, referring to a larger variety of same-sex role models than only their parents. The size of the standardized coefficient indicates that the index of dissimilarity and thus the reference to same-sex role models is the most important factor for understanding variations in girls' occupational preferences across countries.

The expected positive association between self-expressive value systems and more gender-typical occupational aspirations, as assumed in Hypothesis 3, is only partly confirmed. Following the argument by Charles and Bradley (2009), we assumed that normative mandates for self-expression encourage the gender-typing of occupations, since girls and boys draw upon different cultural schemes for expressing their “gendered selves” (Charles and Bradley 2009: 930). Yet this assumption is only confirmed for boys, who prefer occupations with a lower share of women in countries with stronger self-expressive values (Model 4). Moreover, in these countries boys develop more male-typical and less female-typical aspirations (Models 5 and 6), which implies

that they are conforming to gender-essentialist stereotypes. According to the size of the standardized coefficient, self-expressive values are the most important indicator for understanding cross-national variations in boys' occupational aspirations. Yet contrary to our expectations, girls also develop a stronger preference for male-typical occupations with a lower share of women (Models 1 and 3), which indicates that the mass emphasis on self-expression makes them more open to atypical choices. It might be that young women in more modern countries express themselves more strongly by marking non-traditional choices rather than following gender-essentialist prescriptions, which is more in line with empirical findings that self-expressive values support "gender empowerment" (Inglehart and Welzel 2005).

Thus, in advanced industrial societies, gender essentialism obviously maintains its strength in shaping the occupational aspirations of young boys only, whereas girls' aspirations seem not to be affected (any longer). Previous studies on this topic also highlighted the effect of gender-essentialist cultures (e.g., Charles 2003, Charles and Grusky 2004, Charles and Bradley 2009), but since they mainly used composite measures of sex segregation by occupation or field of study, they were not able to identify this differentiated effect for young men and women. This finding therefore supports our suggestion to analyze factors influencing boys' and girls' occupational aspirations separately rather than to rely on single measures.

Results are very similar when we include GDP per capita instead of self-expressive value systems in the models, since both variables are highly correlated (see Appendix D). Just as with self-expression, more modern countries (as indicated by higher GDPs per capita) have a desegregating effect on the occupational aspirations of girls, but not for those of boys. This adds to the inconclusive empirical evidence from previous studies, according to which modernization either has a weak, a strong, or no segregating effect (Charles 1992, Charles and Bradley 2009). Interestingly, though, the size of the service sector, which is also highly correlated with GDP per capita and self-expression, indicates the same effect of modernization, namely that in countries with a larger service sector, boys' occupational aspirations are more gender-typical, whereas those of girls are more atypical. Thus, the widely held assumption that the postindustrial labor market structure per se increases young people's preferences for gender-typical occupations has to be rejected, at least with respect to girls.

However, postindustrial restructuring and the feminization of professional and managerial occupations, which increases women's chances of finding employment in high-status occupations, does indeed have a segregating effect on girls' occupational aspirations. As expected in Hypothesis 4, girls tend to prefer occupations with a higher share of women (Model 1), more female-dominated (Model 2) and less male-dominated (Model 3) occupations in countries characterized by strong participation of women in professional and managerial jobs. This

supports findings by Charles and Bradley (2009), who argue that high-status professional occupations, for instance in administration or finance, are widely distributed across industries and not necessarily restricted to the service sector. Women's investment in particular occupations thus seems to depend more strongly on their perceived labor market opportunities than on the industrial composition of the economy. For that reason, it is rational for young women to prefer more female-typical occupations if the benefits of working in these occupations are higher. In contrast, boys' occupational preferences are not influenced by women's employment opportunities in the professions or in management.

The effect of the overall competence advantage of girls also supports our theoretical assumptions (H5), even though mainly for girls' gender-atypical preferences. In countries where girls mean competences both in reading and mathematics are considerably higher than those of the male counterparts, girls develop more preferences for male-typical occupations (Model 3). This finding is consistent with the assumption that young women develop higher levels of self-esteem in countries where they are generally more successful in the education system, irrespective of their individual competence level. In line with findings from Polavieja and Platt (2014) on the individual level our results imply that also on the country level higher levels of girls' self-esteem make them more likely to aim higher on the occupational ladder, where female-dominated jobs are scarce. In contrast, girls' overall competence advantage does not affect the occupational aspirations of boys, which is not surprising given that for them it is generally rational to prefer male-typical occupations due to their higher labor market returns.

In total, the selected macro-level predictors seem well suited to account for cross-national variations in the gender-typing of occupational aspirations. For girls, they explain about 71 per cent of the country variance for the share of women in their occupational aspirations, about 50 per cent for aspiring a female-typical and about 62 per cent for aspiring a male-typical occupation. For boys, the explained country variance is generally lower, but still considerable, since predictors explain about 57 per cent for the share of women in the occupational aspirations, about 45 per cent for preferring a female-typical and about 50 per cent for preferring a male-typical occupation.

Discussion and conclusion

Despite the increasing success of women in the education system, they continue to be disadvantaged in the labor market when compared to equally qualified men. In addition to motherhood and the resulting gendered career trajectories, one prominent explanation for the stability of unequal labor market chances is the occupational sex segregation of the labor market (England 2005). Even though occupational sex segregation is a stable characteristic of all

industrialized countries, it has nevertheless been shown that the gender-typing of occupations is more pronounced in some countries than in others. Therefore, in this paper we looked for explanations for these cross-national variations. Our study goes beyond previous work on this topic by analyzing the realistic occupational aspirations of 15-year-old girls and boys in 29 European and OECD countries. This focus allowed us to systematically differentiate between individual and country-level explanations for gender-(a)typical occupational aspirations. Using that approach, we can dig into the supply-side mechanisms that lie behind the share of men and women in a certain occupation rather than investigate variations in aggregate segregation indices, as has been done in many previous studies on this topic.

More precisely, we looked at two types of possible explanatory mechanisms, which have been identified on the micro level for understanding gender-typical occupational aspirations. First, we analyzed the relevance of socialization theory as regards gendered expectations and same-sex role models and their importance for the gender-typing of occupations. Second, we scrutinized rational choice arguments for the development of occupational preferences, assuming that girls and boys rationally weigh the probability of successfully entering a particular occupation against the benefits and costs of working in this occupation. Since both arguments have mainly been used to understand gender-typical occupational aspirations on the individual level, we expanded these theoretical considerations to account for gender-(a)typical occupational preferences on the country level.

The first central finding of our analysis is that both cultural and structural variations between the countries help us understand the development of gender-(a)typical occupational preferences of young girls and boys. Almost three quarters of the country variance in the gender-typing of occupations for girls and almost two thirds for boys can be accounted for by the respective institutional features. However, the mechanisms at work seem to be quite different for girls and boys.

For girls, results indicate that it is mainly structural characteristics of the labor market and the education system that account for their occupational preferences. In particular, girls develop more gender-atypical occupational preferences if they live in countries with less occupational segregation in the labor market, a larger share of women employed in professional and managerial jobs, and if girls generally achieve higher competence scores in secondary education. Thus, girls seem to develop less stereotypical occupational preferences if they have a larger share of same-sex role models in their environment, if they perceive better labor market opportunities in high-status occupations, and if they develop a higher self-esteem for working in non-traditional jobs. But developing more male-typical occupational aspirations also seems to be a possibility for girls to express their “gendered selves,” which is at odds with previous

arguments on this topic, while progressive gender ideology alone does not seem sufficient for overcoming the gender-typing of occupations among girls.

Boys, in contrast, seem to be mainly influenced by gendered socialization processes and a country's cultural environment. In particular, gender essentialism in combination with stronger values of self-expression has a segregating effect on the occupational aspirations of boys, since they use male-typical occupational aspirations as an expression of their masculinity. Self-expressive value systems seem to support the enactment of their "gendered selves" by expressing individual preferences for more male-typical occupations. Altogether, our findings thus challenge the unidirectional relationship between gender essentialism and values of self-expression assumed in many previous studies. Self-expression seems to have different meanings for men and women in modern societies, a fact that also translates into different occupational aspirations, and possibly labor market outcomes as well. In particular, it remains an open question why self-expression does not have the same effect for girls as for boys, but rather goes in opposite directions. Thus, further research will have to establish how gender-essentialist cultures interact with self-expressive value system for men and women separately.

Due to the cross-sectional nature of our data, we can only present a snapshot of occupational preferences, and we are not able to assess how the gender-typing of occupations develops over the life course and how this translates into actual occupational placements. Our results from the level-1 estimations (see Appendix B) indicate that only a very small part of the individual-level variation in gender-(a)typical occupational preferences is actually understood by focusing on one specific point of time in the life courses of individuals, a finding which is in line with previous studies (e.g. Helbig and Leuze 2012 for Germany; Jonsson 1999 for Sweden; Xie and Shauman 1997 for the US). Therefore, in order to fully understand how gender-(a)typical preferences develop, stabilize, and sometimes even change, it is therefore necessary to use longitudinal data, which allows for taking into account for cross-national variations in both socialization and rational choice processes as they unfold over the life course.

An additional argument for a longitudinal analysis of the development of occupational aspirations are differences between the results of this study, which merely focuses on the supply-side mechanism by analyzing occupational preferences, and those of other studies, which examine occupational placement and therefore account for both, supply- and demand-side processes of the gender-typing of occupations. Especially the result that preferences for "male" occupations can be conceived as self-expression of girls indicates that girls might be channeled into more female-typical occupations once employer preferences and gatekeeping processes come into play (Reskin 1993). Yet only by following individuals over their life courses—from the development of occupational preferences to their actual occupational placement in the labor

market—will it be possible to fully disentangle the diverse effects of supply- and demand-side processes.

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Appendix

Appendix A: Variable names and definition

| Dependent variable | |
|--|--|
| Gender-typing of occupational aspiration (metric) | <p>Share of women in each occupational category (ISCO 88 3-digit) aspired by 15-year-old girls and boys at the age of 30 based on PISA 2006 data merged with data from nationally representative labor force statistics mainly for the year 2000/2001.</p> <p>Main source: ILO Segregate Database (http://laborsta.ilo.org/STP/guest)</p> <p>For the US-Data, ILO provides only national codes. We recoded them based on scheme provided by Ganzeboom, Harry B.G.; Treiman, Donald J., International Stratification and Mobility File, Tools for Standardizing Occupation Codes. USA80.OIK</p> <p>For Canada and Norway (ISCO-88), data were provided by the respective National Statistical Bureaus.</p> <p>For Canada, we recoded 523 national occupational codes into ISCO88 3-digit codes.</p> |
| Gender-typing of occupational aspiration (categorical) | <p>'female occupation' (share of women in occupation 70 per cent and above)</p> <p>'integrated occupation' (share of women in occupation 31 to 69 per cent)</p> <p>'male occupation' (share of women in occupation 30 per cent and below)</p> |
| Independent variables | |
| National level characteristics | |
| Gender norms regarding the division of household labor | <p>Indicator on attitudes towards the division of household labor based on the weighted dichotomized country mean of the following item:</p> <p>"Both the husband and wife should contribute to household income."</p> <p>Higher values indicate that a higher share of the population supports a dual-earner model and therefore represent more progressive attitudes towards the division of household labor.</p> <p>Data sources: International Social Survey Program 2002 (http://www.issp.org/) and World Value Survey 1999 (http://http://www.worldvaluessurvey.org/)</p> |
| Index of Dissimilarity | <p>Proportion of women (or men), who would need to change their occupation in order to achieve an occupational sex composition that equals the sex composition of the labor market.</p> $D = \sum_{j=1}^J (F_j/F) - (M_j/M) \times 100 \times 1/2$ <p>F_j = N women in occupation j F = N women in the labor force M_j = N men in occupation j M = N men in the labor force</p> <p>Main source: ILO Segregate Database (http://laborsta.ilo.org/STP/guest)</p> <p>See also comments for dependent variable</p> |

| | |
|--|---|
| Survival/self-expression values | <p>Composite measure of self-expression values as provided by Inglehart and Welzel (2005), which give high priority to environmental protection, tolerance of diversity, rising demands for participation in decision making in economic and political life, tolerance of outgroups (e.g. foreigners, gays and lesbians), and a shift in child-rearing values, from emphasis on hard work toward emphasis on imagination and tolerance as important values to teach a child.</p> <p>Data source: World Value Survey 2000, (http://www.worldvaluessurvey.org/wvs/articles/folder_published/article_base_54)</p> |
| Women's employment in professions and management | <p>Proportion of women employed in professions (ISCO88 major groups 1 and 2) of all women in employment for the year 2006.</p> <p>Data source: ILO Labor Statistics Database – KILM 8th edition (Key indicators of the labor market) (http://kilm.ilo.org/2011/Installation/Application2013/kilm13install.htm)</p> |
| Girls' overall competence advantage | <p>Girls' mean competence scores in reading and mathematics in comparison to boys' based on PISA 2006 data (weighted). For the US, we used the competence scores from PISA 2003 because reading literacy is not available for the US in the PISA 2006 wave.</p> <p>competence advantage = (mean girls' reading scores – mean boys' reading scores) + (mean girl's math scores – mean boys' math scores)</p> |
| Female to male employment rate | <p>Women's employment rate divided men's employment rate in 2006.</p> <p>Data sources: Eurostat (http://epp.eurostat.ec.europa.eu/portal/page/portal/employment_unemployment_lfs/data/main_tables)</p> <p>OECD: (http://www.oecd.org/gender/data/indicatorsofgenderequalityinemployment.htm)</p> |
| GDP per capita | <p>Gross domestic product per capita in 2006, current prices in US dollars.</p> <p>Data source: Penn World Table (https://pwt.sas.upenn.edu/php_site/pwt_index.php)</p> |
| Size of service sector | <p>National share of employment in the tertiary sector.</p> <p>Data sources: Eurostat (http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes)</p> <p>OECD: (http://stats.oecd.org/)</p> |
| Individual level characteristics | |
| Age | Age of respondent, metric variable in months |
| Grade | School grade of respondent, metric variable |
| Migration status | Migration status of respondent, dummy variable 0 "native" 1 "first and second generation migrant" |
| Socioeconomic status | Index of economic, social and cultural status (ESCS) as provided by PISA |
| Mother's occupation | <p>Categorical variable:</p> <p>'female occupation' (share of women in occupation 70 per cent and above) (Ref.)</p> |
| Father's occupation | <p>'integrated occupation' (share of women in occupation 31 to 69 per cent)</p> <p>'male occupation' (share of women in occupation 30 per cent and below)</p> <p>'not working'</p> <p>'not available/known'</p> <p>Source: see dependent variable.</p> |

| | |
|----------------------------------|--|
| Mathematical competencies | Plausible value in math literacy, metric variable |
| Science competencies | Plausible value in science literacy, metric variable |
| Value of science | <p>Composite index for general value of science (wle) based on the following items:</p> <ul style="list-style-type: none"> a) Advances in science and technology usually improve people's living conditions b) Science is important for helping us to understand the natural world c) Advances in science and technology usually help improve the economy d) Science is valuable to society e) Advances in science and technology usually bring social benefits |
| Importance of science for future | <p>Composite index for future-oriented science motivation (wle) based on the following items:</p> <ul style="list-style-type: none"> a) I would like to work in a career involving science b) I would like to study science after secondary school c) I would like to spend my life doing advanced science d) I would like to work on science projects as an adult |

Appendix B: Results of the level-1 regressions for the theoretically relevant coefficients

Girls' occupational aspirations

| | Socialization | | | | | Rational choice | | | | | | |
|----|-------------------------------------|-----------------------------------|--------|-----------------------------------|--------|-----------------|------------------|------------------------------------|--------------------------|-----------|-----------------------------------|------|
| | Socioeconomic status parents (ESCS) | Mother's occupation (ref: female) | | Father's occupation (ref: female) | | Math literacy | Science literacy | Future-oriented science motivation | General value of science | Intercept | Explained variance ind. level (%) | N |
| | | integrated | male | integrated | male | | | | | | | |
| AT | -2.69** | -0.69 | -3.64 | -4.57 | -1.62 | -0.03 | -0.01 | -0.92 | -0.53 | 54.03 | 1,87 | 1662 |
| | (0.79) | (1.25) | (2.12) | (2.86) | (2.77) | (0.02) | (0.02) | (0.61) | (0.59) | (1.13) | | |
| BE | -1.59* | -2.69* | -0.99 | -3.02+ | 0.38 | -0.04* | -0.03 | -3.68** | -0.77 | 57.09 | 7,57 | 3265 |
| | (0.57) | (1.06) | (1.45) | (1.66) | (1.51) | (0.02) | (0.02) | (0.45) | (0.51) | (0.66) | | |
| BG | 1.61* | -0.98 | -1.29 | 0.25 | 0.32 | -0.00 | 0.01 | -0.45 | -1.69** | 60.33 | 2,20 | 1468 |
| | (0.69) | (1.54) | (1.88) | (1.81) | (1.82) | (0.01) | (0.01) | (0.62) | (0.58) | (0.57) | | |
| CA | 0.41 | -1.78** | -1.24+ | 1.33 | -0.41 | 0.01 | -0.01* | 3.24** | 0.31 | 54.48 | 3,89 | 9068 |
| | (0.29) | (0.49) | (0.70) | (0.84) | (0.88) | (0.01) | (0.01) | (0.20) | (0.23) | (0.21) | | |
| CZ | -2.49** | -2.03 | -2.09 | 5.08 | 3.13 | -0.03+ | -0.02 | -0.30 | -1.23+ | 57.37 | 1,83 | 1882 |
| | (0.81) | (1.22) | (1.60) | (3.28) | (3.15) | (0.01) | (0.02) | (0.63) | (0.71) | (0.85) | | |
| DK | -1.51+ | -2.00 | -5.78* | 3.15 | 2.70 | -0.01 | -0.07** | 1.03 | -0.92 | 54.99 | 8,35 | 1730 |
| | (0.83) | (1.61) | (2.26) | (2.69) | (2.45) | (0.02) | (0.02) | (0.66) | (0.88) | (0.63) | | |
| EE | -3.86** | -1.52 | -3.42 | 2.65 | 0.71 | -0.04* | -0.00 | 2.16** | -1.33 | 63.19 | 3,21 | 1794 |
| | (0.93) | (1.47) | (3.16) | (3.06) | (2.92) | (0.02) | (0.02) | (0.77) | (0.81) | (0.78) | | |
| FI | -1.28 | -0.00 | -1.45 | 1.51 | 3.16 | 0.03+ | -0.06** | 0.88 | -0.63 | 64.35 | 2,59 | 1901 |
| | (0.82) | (1.49) | (2.74) | (2.18) | (2.02) | (0.02) | (0.01) | (0.75) | (0.76) | (0.61) | | |
| FR | -3.31** | -0.88 | -3.14 | -0.25 | 2.10 | -0.02 | -0.03+ | -1.07+ | -0.87 | 53.09 | 2,17 | 1778 |
| | (0.80) | (1.36) | (2.20) | (2.57) | (2.42) | (0.02) | (0.01) | (0.56) | (0.64) | (0.70) | | |
| DE | -3.88** | 1.37 | 1.63 | -1.36 | 0.16 | -0.04* | -0.04* | -1.66* | 0.17 | 56.38 | 6,41 | 1568 |
| | (0.74) | (1.30) | (2.20) | (2.75) | (2.62) | (0.02) | (0.02) | (0.61) | (0.65) | (0.74) | | |
| GR | -0.19 | -0.14 | -1.21 | 4.40 | 3.14 | -0.03** | -0.01 | -3.13** | -1.22* | 45.81 | 5,69 | 1885 |
| | (0.57) | (1.40) | (1.71) | (4.18) | (4.15) | (0.01) | (0.01) | (0.45) | (0.57) | (0.60) | | |

| | | | | | | | | | | | | |
|----|---------|--------|--------|---------|---------|---------|---------|---------|---------|--------|-------|------|
| HU | -2.80** | -0.90 | -1.97 | 5.85* | 2.48 | -0.01 | -0.00 | 0.99 | -2.09** | 53.36 | 2,81 | 1531 |
| | (0.77) | (1.33) | (1.79) | (2.41) | (2.21) | (0.02) | (0.02) | (0.63) | (0.70) | (0.83) | | |
| IS | -3.72 | -1.39 | -4.01 | -0.54 | -3.13 | -0.04 | -0.01 | -2.95 | 0.20 | 52.68 | 7,91 | 1528 |
| | (0.83) | (1.53) | (2.39) | (3.07) | (2.96) | (0.02) | (0.02) | (0.74) | (0.76) | (0.69) | | |
| IE | -2.81** | -2.15 | -4.15* | -0.88 | -2.25 | -0.02 | -0.04* | -0.72 | 0.10 | 58.48 | 7,72 | 1933 |
| | (0.78) | (1.30) | (1.87) | (3.04) | (2.83) | (0.02) | (0.02) | (0.60) | (0.63) | (0.61) | | |
| IT | -1.55** | -0.35 | -0.69 | 0.15 | -0.34 | -0.01 | -0.01+ | -2.70** | -0.43+ | 42.98 | 3,43 | 8569 |
| | (0.22) | (0.51) | (0.82) | (1.16) | (1.13) | (0.01) | (0.01) | (0.21) | (0.22) | (0.31) | | |
| LV | -1.98* | -2.51+ | -5.19+ | -5.45* | -4.75+ | -0.02 | -0.01 | 2.37** | -0.92 | 58.33 | 3,62 | 1922 |
| | (0.71) | (1.35) | (2.64) | (2.48) | (2.36) | (0.02) | (0.02) | (0.68) | (0.69) | (0.59) | | |
| LI | -1.07 | -2.32 | -4.54 | -1.12 | 0.15 | -0.00 | -0.02 | 5.18 | 0.60 | 64.23 | 4,50 | 1768 |
| | (0.78) | (1.46) | (3.12) | (2.31) | (2.18) | (0.02) | (0.02) | (0.73) | (0.76) | (0.61) | | |
| LU | -3.29** | -1.52 | -2.86 | 1.02 | 2.01 | -0.02 | -0.04** | -0.09 | 0.98 | 50.63 | 4,75 | 1832 |
| | (0.65) | (1.42) | (2.16) | (2.56) | (2.44) | (0.02) | (0.02) | (0.54) | (0.59) | (0.85) | | |
| NL | -2.76** | -2.99* | -1.58 | -1.38 | -2.12 | -0.05* | -0.04* | 0.35 | -2.10** | 57.45 | 2,64 | 2027 |
| | (0.68) | (1.19) | (1.97) | (2.37) | (2.33) | (0.02) | (0.02) | (0.64) | (0.67) | (0.61) | | |
| NO | -3.75** | 0.85 | -1.77 | 0.24 | -0.93 | -0.03+ | -0.04* | -2.44** | -2.11** | 48.46 | 11,26 | 1626 |
| | (0.94) | (1.55) | (2.01) | (3.30) | (3.04) | (0.02) | (0.02) | (0.73) | (0.74) | (0.75) | | |
| PL | -2.39** | -1.17 | 2.35 | -1.10 | -1.38 | -0.02+ | -0.03* | 1.51** | -0.03 | 61.32 | 5,42 | 2239 |
| | (0.61) | (1.13) | (2.16) | (2.21) | (2.12) | (0.01) | (0.01) | (0.53) | (0.58) | (0.51) | | |
| PT | -2.11** | 0.15 | -2.59 | -0.15 | 0.18 | -0.01 | -0.02 | 1.60** | -0.69 | 53.86 | 2,59 | 2017 |
| | (0.49) | (1.22) | (2.36) | (2.32) | (2.26) | (0.01) | (0.02) | (0.55) | (0.65) | (0.54) | | |
| SK | -1.72* | 0.66 | 0.57 | -1.49 | 1.44 | -0.02 | -0.01 | -1.09 | -0.58 | 58.54 | 2,93 | 1685 |
| | (0.76) | (1.27) | (2.61) | (2.53) | (2.44) | (0.02) | (0.02) | (0.63) | (0.73) | (0.74) | | |
| SI | -2.31** | -0.26 | -1.95 | -0.59 | -0.74 | -0.00 | -0.02 | -0.12 | 0.50 | 59.28 | 1,00 | 2349 |
| | (0.73) | (1.22) | (1.86) | (2.66) | (2.52) | (0.02) | (0.01) | (0.61) | (0.65) | (1.08) | | |
| ES | -1.72** | -1.10+ | -0.92 | -4.72** | -5.38** | -0.02** | -0.03** | -3.04** | -0.72** | 47.25 | 11,25 | 7347 |
| | (0.24) | (0.58) | (0.96) | (1.60) | (1.58) | (0.01) | (0.01) | (0.21) | (0.24) | (0.24) | | |
| SE | -3.04** | -2.00 | -3.79+ | 0.63 | 0.06 | -0.03 | -0.01 | -0.03 | -0.69 | 51.83 | 4,19 | 1755 |

| | | | | | | | | | | | | |
|----|---------|--------|--------|--------|--------|---------|---------|---------|---------|--------|------|------|
| | (0.81) | (1.26) | (2.14) | (2.36) | (2.33) | (0.02) | (0.02) | (0.63) | (0.67) | (0.58) | | |
| CH | -2.87** | -2.02* | -3.24* | -0.25 | -0.26 | -0.01 | -0.04** | -0.74 | 0.21 | 54.01 | 1,86 | 4723 |
| | (0.53) | (0.92) | (1.42) | (1.69) | (1.60) | (0.01) | (0.01) | (0.44) | (0.47) | (0.42) | | |
| UK | -3.56** | -1.78* | -2.00 | -2.39 | -2.32+ | -0.02** | -0.04** | 0.22 | -1.33** | 57.45 | 7,18 | 5624 |
| | (0.46) | (0.74) | (1.39) | (1.45) | (1.38) | (0.01) | (0.01) | (0.34) | (0.38) | (0.37) | | |
| US | -0.69 | 0.08 | -1.88 | -0.01 | -0.23 | -0.02 | -0.01 | -2.63** | -0.10 | 51.30 | 3,69 | 2247 |
| | (0.61) | (1.03) | (2.49) | (1.67) | (1.72) | (0.01) | (0.01) | (0.49) | (0.48) | (0.50) | | |

Data sources: PISA 2006 data, authors' estimations

Standard errors in parentheses, + p < 0.10, * p < 0.05, ** p < 0.01

Controls not shown: age, grade, migration status, mother and father without occupation, occupation of mother and father not known

Boys' occupational aspirations

| | Socialization | | | | | Rational choice | | | | | | |
|----|-------------------------------------|-----------------------------------|-------------------|-----------------------------------|-------------------|-----------------|------------------|------------------------------------|--------------------------|-----------------|-----------------------------------|------|
| | Socioeconomic status parents (ESCS) | Mother's occupation (ref: female) | | Father's occupation (ref: female) | | Math literacy | Science literacy | Future-oriented science motivation | General value of science | Intercept | Explained variance ind. level (%) | N |
| | | integrated | male | integrated | male | | | | | | | |
| AT | 1.36+ (0.72) | -1.34 (1.17) | -0.79 (2.07) | 2.66 (2.66) | -1.45 (2.60) | 0.01 (0.02) | 0.00 (0.02) | 1.99** (0.53) | -0.31 (0.52) | 28.28 (1.12) | 2,66 | 1584 |
| BE | 0.74 (0.52) | 0.18 (0.95) | -0.64 (1.33) | -1.62 (1.45) | -3.34* (1.34) | 0.00 (0.01) | 0.02 (0.01) | -2.29** (0.41) | 0.41 (0.41) | 29.05 (0.83) | 1,42 | 3474 |
| BG | 1.24 (0.74) | 2.11 (1.71) | 0.55 (2.13) | -2.56 (2.06) | -2.27 (2.06) | -0.01 (0.01) | 0.02 (0.01) | -0.14 (0.64) | 0.24 (0.59) | 58.98 (0.72) | 0,88 | 1489 |
| CA | 3.14** (0.35) | -0.61 (0.62) | -2.51** (0.92) | -1.29 (1.03) | -4.74** (1.08) | -0.00 (0.01) | 0.02** (0.01) | 2.60** (0.27) | 1.18** (0.26) | 41.07 (0.29) | 5,98 | 8483 |
| CZ | 1.77* (0.70) | -0.66 (1.10) | 0.25 (1.39) | 0.33 (2.53) | -1.78 (2.34) | -0.01 (0.01) | 0.03+ (0.02) | 0.59 (0.53) | -0.90 (0.55) | 28.07 (0.80) | 1,38 | 1910 |
| DK | 2.48** (0.82) | 0.58 (1.61) | -1.15 (2.20) | -2.18 (2.44) | -4.79* (2.17) | 0.01 (0.02) | 0.02 (0.02) | 0.23 (0.63) | 0.50 (0.70) | 26.91 (0.63) | 2,27 | 1665 |
| EE | 2.69** (0.94) | 1.58 (1.53) | -1.73 (3.24) | 0.75 (2.86) | -4.13 (2.75) | 0.01 (0.02) | 0.04* (0.02) | 2.98** (0.77) | 0.13 (0.75) | 32.28 (0.76) | 6,25 | 1747 |
| FI | 4.85** (0.95) | -0.49 (1.72) | 0.50 (2.79) | -2.51 (2.47) | -6.41** (2.30) | 0.01 (0.02) | 0.04* (0.02) | 4.36** (0.82) | -0.61 (0.79) | 28.15 (0.75) | 7,68 | 1559 |
| FR | 1.77* (0.81) | 2.13 (1.39) | 0.53 (2.25) | -1.25 (2.46) | -2.10 (2.30) | 0.01 (0.02) | -0.00 (0.02) | -2.39** (0.59) | -0.44 (0.61) | 28.27 (0.78) | 3,44 | 1573 |
| DE | 0.06 (0.77) | 0.35 (1.45) | -1.44 (2.49) | -5.67+ (2.82) | -8.60** (2.67) | 0.00 (0.02) | 0.00 (0.02) | -1.96** (0.61) | 0.90 (0.61) | 29.98 (0.73) | 3,05 | 1449 |
| GR | 1.95** (0.62) | -2.35 (1.52) | 1.67 (1.86) | 2.60 (3.93) | -0.82 (3.87) | -0.01 (0.01) | 0.04** (0.01) | -1.05* (0.50) | -0.30 (0.56) | 28.72 (0.66) | 2,00 | 1537 |
| HU | 1.46+ (0.72) | 0.53 (1.17) | -0.09 (2.07) | -1.67 (2.66) | -5.51* (2.60) | -0.01 (0.02) | 0.03* (0.02) | 0.87 (0.53) | -0.00 (0.52) | 32.13 (1.12) | 1,65 | 1439 |

| | | | | | | | | | | | | |
|----|--------|--------|--------|--------|---------|--------|--------|---------|--------|--------|-------|------|
| | (0.73) | (1.27) | (1.62) | (2.51) | (2.36) | (0.02) | (0.01) | (0.61) | (0.60) | (1.08) | | |
| IS | 1.49+ | 0.15 | -3.85+ | -4.67 | -9.05** | 0.02 | 0.01 | -0.66 | -0.18 | 29.87 | 2,53 | 1334 |
| | (0.82) | (1.53) | (2.16) | (2.98) | (2.88) | (0.02) | (0.02) | (0.72) | (0.68) | (0.71) | | |
| IE | 2.62** | 0.26 | 1.23 | -0.36 | -4.00 | 0.01 | 0.03* | 2.63** | 0.16 | 26.17 | 7,36 | 1791 |
| | (0.69) | (1.24) | (1.75) | (3.18) | (3.03) | (0.02) | (0.01) | (0.56) | (0.54) | (0.53) | | |
| IT | -0.20 | 0.08 | 0.07 | 0.69 | -1.98+ | -0.01 | 0.00 | 0.20 | -0.08 | 28.02 | 0,84 | 8396 |
| | (0.21) | (0.48) | (0.76) | (1.10) | (1.07) | (0.00) | (0.00) | (0.19) | (0.19) | (0.38) | | |
| LV | 2.64** | 0.50 | -2.73 | -3.76 | -9.05** | 0.02 | 0.02 | 1.72* | 0.77 | 32.40 | 4,58 | 1528 |
| | (0.82) | (1.55) | (2.81) | (2.81) | (2.70) | (0.02) | (0.02) | (0.75) | (0.72) | (0.68) | | |
| LI | 4.09** | -2.68 | 0.44 | -1.14 | -5.36* | 0.04+ | 0.04+ | 4.34** | 1.33+ | 36.47 | 11,30 | 1637 |
| | (0.83) | (1.59) | (4.25) | (2.49) | (2.37) | (0.02) | (0.02) | (0.76) | (0.73) | (0.71) | | |
| LU | 0.75 | -1.24 | -2.89 | -1.19 | -3.59 | 0.01 | -0.01 | 0.22 | 0.43 | 26.07 | 0,78 | 1664 |
| | (0.71) | (1.52) | (2.36) | (2.90) | (2.75) | (0.02) | (0.02) | (0.55) | (0.52) | (1.26) | | |
| NL | 2.25** | -1.36 | -4.71* | -1.49 | -4.18+ | 0.01 | 0.03+ | -4.39** | 0.60 | 30.56 | 4,58 | 1978 |
| | (0.64) | (1.14) | (1.87) | (2.28) | (2.24) | (0.02) | (0.02) | (0.56) | (0.58) | (0.56) | | |
| NO | 3.73** | -0.17 | 1.53 | 1.55 | -1.39 | 0.02 | 0.01 | -1.23* | -0.04 | 21.16 | 3,74 | 1624 |
| | (0.78) | (1.29) | (1.69) | (2.71) | (2.52) | (0.01) | (0.01) | (0.56) | (0.53) | (0.56) | | |
| PL | 2.29** | -1.20 | 1.69 | -3.10 | -5.67* | -0.00 | 0.03* | 2.89** | -0.39 | 35.59 | 3,87 | 2066 |
| | (0.67) | (1.22) | (2.45) | (2.34) | (2.26) | (0.02) | (0.01) | (0.57) | (0.60) | (0.58) | | |
| PT | 1.60** | 1.05 | 0.23 | 1.11 | -0.29 | 0.01 | 0.03+ | 1.02+ | 0.92 | 30.77 | 7,08 | 1784 |
| | (0.43) | (1.09) | (2.15) | (2.08) | (2.03) | (0.02) | (0.02) | (0.51) | (0.54) | (0.54) | | |
| SK | 1.82* | -0.63 | -3.09 | -6.42* | -5.66* | 0.00 | 0.01 | 0.52 | 0.97 | 35.70 | 2,12 | 1584 |
| | (0.77) | (1.31) | (2.42) | (2.74) | (2.64) | (0.02) | (0.02) | (0.62) | (0.65) | (1.00) | | |
| SI | -0.40 | -0.42 | -1.70 | 1.81 | -0.43 | 0.01 | -0.00 | 0.51 | -0.39 | 33.43 | 0,71 | 2412 |
| | (0.63) | (1.05) | (1.70) | (2.34) | (2.20) | (0.02) | (0.01) | (0.54) | (0.48) | (1.11) | | |
| ES | 1.94** | 0.40 | -0.51 | 0.13 | -2.19 | -0.01* | 0.02** | -0.71** | -0.23 | 23.75 | 6,20 | 6649 |
| | (0.25) | (0.62) | (1.01) | (1.72) | (1.70) | (0.01) | (0.01) | (0.22) | (0.23) | (0.25) | | |
| SE | 3.28** | 1.07 | -0.16 | -1.86 | -5.90** | 0.00 | 0.02+ | 0.45 | 0.96+ | 26.15 | 5,66 | 1776 |
| | (0.69) | (1.07) | (1.81) | (2.12) | (2.09) | (0.01) | (0.01) | (0.55) | (0.52) | (0.49) | | |

| | | | | | | | | | | | | |
|----|--------|--------|--------|--------|---------|--------|--------|---------|--------|--------|------|------|
| CH | 1.94** | 0.49 | -1.03 | -1.63 | -5.45** | -0.01 | 0.01 | -0.41 | -0.59+ | 23.33 | 1,43 | 4992 |
| | (0.41) | (0.74) | (1.11) | (1.29) | (1.22) | (0.01) | (0.01) | (0.33) | (0.32) | (0.36) | | |
| UK | 3.19** | -0.60 | -1.26 | -2.53 | -4.90** | -0.00 | 0.03** | 0.53 | 0.10 | 25.92 | 3,68 | 5243 |
| | (0.45) | (0.76) | (1.31) | (1.53) | (1.48) | (0.01) | (0.01) | (0.35) | (0.33) | (0.34) | | |
| US | 0.48 | 0.69 | -0.57 | -0.86 | -3.64* | 0.02 | -0.00 | -1.97** | 0.93* | 35.94 | 1,71 | 2131 |
| | (0.58) | (0.99) | (2.13) | (1.58) | (1.64) | (0.01) | (0.01) | (0.48) | (0.43) | (0.49) | | |

Data sources: PISA 2006 data, authors' estimations

Standard errors in parentheses, + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Controls not shown: age, grade, migration status, mother and father without occupation, occupation of mother and father not known

Appendix C: Level-2 linear regression models for girls' and boys' occupational aspirations, single inclusion of country variables

| | (1) Girls, % women | (2) Girls, % fem. occ. | (3) Girls, % male occ. | (4) Boys, % women | (5) Boys, % fem. occ. | (6) Boys, % male occ. |
|--|--------------------------|------------------------------|------------------------------|-------------------------|-----------------------------|-----------------------------|
| Progressive norms reg. division of household labor | -2.276* (0.923) | -0.028 (0.023) | 0.023* (0.008) | -2.916* (1.233) | -0.016 (0.010) | 0.046* (0.021) |
| Constant | 55.274*** (0.900) | 0.314*** (0.023) | 0.141*** (0.008) | 30.818*** (1.202) | 0.080*** (0.010) | 0.512*** (0.021) |
| Observations | 29 | 29 | 29 | 29 | 29 | 29 |
| R ² | 0.184 | 0.052 | 0.221 | 0.171 | 0.090 | 0.143 |
| Index of dissimilarity | 3.734** (1.224) | 0.084** (0.029) | -0.008 (0.013) | -1.054 (1.871) | 0.020 (0.014) | 0.033 (0.032) |
| Constant | 53.983*** (0.956) | 0.285*** (0.022) | 0.144*** (0.010) | 31.166*** (1.461) | 0.073*** (0.011) | 0.501*** (0.025) |
| Observations | 29 | 29 | 29 | 29 | 29 | 29 |
| R ² | 0.256 | 0.241 | 0.013 | 0.012 | 0.074 | 0.039 |
| Survival/self-expression values | -2.045* (0.852) | -0.019 (0.022) | 0.019* (0.008) | -3.230** (1.078) | -0.023* (0.008) | 0.051* (0.019) |
| Constant | 55.106*** (0.906) | 0.312*** (0.023) | 0.143*** (0.008) | 30.555*** (1.147) | 0.078*** (0.009) | 0.516*** (0.020) |
| Observations | 29 | 29 | 29 | 29 | 29 | 29 |
| R ² | 0.176 | 0.027 | 0.179 | 0.250 | 0.211 | 0.210 |
| Women in professions, management | 1.361 (0.953) | 0.026 (0.022) | -0.025** (0.008) | 1.371 (1.283) | 0.010 (0.010) | -0.039+ (0.021) |
| Constant | 55.098*** (0.967) | 0.310*** (0.023) | 0.144*** (0.008) | 30.638*** (1.303) | 0.079*** (0.010) | 0.517*** (0.021) |
| Observations | 29 | 29 | 29 | 29 | 29 | 29 |
| R ² | 0.070 | 0.046 | 0.278 | 0.041 | 0.035 | 0.113 |
| Girls' overall competence advantage | 1.238 (0.985) | 0.014 (0.023) | -0.001 (0.009) | 2.902* (1.222) | 0.021* (0.009) | -0.038+ (0.022) |
| Constant | 55.263*** (0.968) | 0.313*** (0.023) | 0.141*** (0.009) | 30.805*** (1.201) | 0.080*** (0.009) | 0.512*** (0.021) |
| Observations | 29 | 29 | 29 | 29 | 29 | 29 |
| R ² | 0.055 | 0.012 | 0.000 | 0.173 | 0.162 | 0.101 |
| R ² | 1.238 | 0.014 | -0.001 | 2.902* | 0.021* | -0.038+ |

Data sources: PISA 2006 data merged with macro-level indicators from several sources, authors' estimations

Standard errors in parentheses, + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Appendix D: Second-level linear regression models for girls' and boys' occupational aspirations, with GDP per capita and size of service sector instead of Survival/self-expression values

| | (1) Girls, % women | (2) Girls, % women | (3) Girls, % women | (4) Boys, % women | (5) Boys, % women | (6) Boys, % women |
|--|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|
| Progressive norms reg. division of wage work | -0.124 (0.805) | -0.296 (0.806) | 0.090 (0.728) | -2.438* (1.222) | -2.762* (1.254) | -2.674* (1.302) |
| Index of dissimilarity | 2.781* (1.071) | 3.541** (1.033) | 2.856** (0.941) | -4.555* (1.627) | -3.605* (1.608) | -3.982* (1.684) |
| Women in professions, management | 1.757* (0.765) | 2.234* (0.796) | 2.800*** (0.731) | -1.284 (1.161) | -0.822 (1.239) | -0.536 (1.309) |
| Girls' overall competence advantage | -1.174 (0.700) | -0.854 (0.667) | -1.330* (0.618) | 1.984+ (1.063) | 2.519* (1.038) | 2.430* (1.107) |
| Survival/self- expression values | -2.844** (0.857) | | | -3.246* (1.302) | | |
| GDP per capita | | -1.955** (0.625) | | | -1.912+ (0.973) | |
| Size of service sector | | | -3.147*** (0.726) | | | -2.297+ (1.299) |
| Female to male employment rate | 3.181** (0.961) | 2.058* (0.828) | 3.124*** (0.815) | 2.563+ (1.460) | 1.159 (1.289) | 1.750 (1.459) |
| Constant | 53.416*** (0.719) | 53.431*** (0.733) | 53.110*** (0.647) | 31.047*** (1.092) | 31.040*** (1.142) | 30.770*** (1.158) |
| Observations | 29 | 29 | 29 | 29 | 29 | 29 |
| R ² | 0.700 | 0.689 | 0.758 | 0.607 | 0.571 | 0.558 |

Data sources: PISA 2006 data merged with macro-level indicators from several sources, authors' estimations

Standard errors in parentheses, + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

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